P0337: CRANKSHAFT POSITION SENSOR CIRCUIT A LOW INPUT

OVERVIEW

Severity	:	High
DIY Difficulty Level	:	Intermediate
Repair Cost	:	**$200-$400**
Can I Still Drive?	:	No

What Does The P0337 Code Mean?

This diagnostic trouble code (DTC) is a generic powertrain code, which means that it applies to OBD-II equipped vehicles (GM, Chevrolet, Volvo, GMC, Saab, Dodge, Ford, Kia, Hyundai, etc.). Although generic, the specific repair steps may vary depending on make/model.

When I have diagnosed a stored code P0337 (in the past) it was because the powertrain control module (PCM) had detected a low input voltage signal from the crankshaft position (CKP) sensor circuit.

CKP sensors are responsible for monitoring engine speed (RPM) and crankshaft position. Both of these factors are used in various engine management scenarios but are especially critical to ignition (spark) timing and fuel delivery.

The position of the crankshaft, particularly in relation to the camshaft/s, is one of the key factors used by the PCM to calculate ignition spark timing. The camshafts turn at half the speed of the crankshaft, so it is important that the PCM is able to distinguish between engine intake and exhaust stokes (rotations). The CKP sensor and each camshaft position (CMP) sensor have at least one circuit dedicated to providing the PCM with an input signal, a 5-volt reference signal, and a ground.

CKP sensors are typically of the electro magnetic, hall-effect variety. They are mounted to the exterior of the engine in very close proximity (usually only several thousandths of an inch) to a

circuit completing engine ground. This engine ground is usually a reluctor ring (with precisely machined teeth) affixed to one end of the crankshaft or integrated into the crankshaft itself.

The CKP sensor is mounted so that the crankshaft reluctor wheel passes very closely to its magnetic tip. As the crankshaft rotates, the raised areas (on the reluctor wheel) complete an electromagnetic circuit with the sensor. When the gaps between the teeth pass the CKP sensor, the circuit is briefly interrupted. The circuit interruptions create voltage fluctuations that the PCM perceives as a waveform pattern.

With the engine running, the PCM constantly compares input signals from the CKP and CMP sensors. If CKP input signal voltage is lower than expected under certain circumstances, a P0337 code will be stored and a MIL may be illuminated.

Other crankshaft position sensor trouble codes include P0335, P0336, P0338, and P0339.

What Are The Symptoms Of The P0337 Code?

Symptoms of this code may include:

- The engine will not start
- The tachometer (if equipped) does not register RPM when the engine is cranked
- Hesitation upon acceleration
- Poor engine performance
- Diminished fuel efficiency

What Are The Potential Causes Of The P0337 Code?

Potential causes for this code to set are:

- Defective CKP sensor
- Open or shorted wiring to the CKP sensor
- Corroded or fluid soaked connector at the CKP sensor
- Faulty PCM or PCM programming error

How Can You Fix The P0337 Code?

Prior to diagnosing a code P0337, I need to have access to a suitable diagnostic scanner, with an integrated digital volt/ohmmeter (DVOM) and oscilloscope. I will also need access to All Data DIY (as a reliable vehicle information source).

Step 1

A viable starting point for any code diagnosis is a visual inspection of system related wiring harnesses and connectors. Since petroleum based fluids compromise the protective insulation on

wiring and lead to shorted or open circuits (and a stored P0337), circuits, electrical sensors, and/or connectors that have been contaminated with engine oil, coolant, or power steering fluid should be examined carefully.

Step 2

If everything looks good, connect the scanner to the vehicle diagnostic port and retrieve all stored trouble codes and freeze frame data. I like writing this information down as it may help if the P0337 proves to be intermittent.

Step 3

Test voltage at the CKP sensor in question. A five-volt reference is typically used for CKP sensor operation but check manufacturer's specifications for the vehicle in question. There should also be a ground signal and one or more output circuits. If reference voltage and ground circuits are detected at the CKP sensor connector, proceed to the next step.

After disconnecting the electrical connector from the CKP sensor in question, test it according to manufacturer's specifications, using the DVOM. If resistance levels in the CKP sensor fail to comply with manufacturer's specifications, replace it.

Step 4

If the CKP sensor does coincide with specs, continue to the next step. Reconnect the CKP sensor in question. Attach the positive test lead of the oscilloscope to the signal output wire and connect the negative lead to the sensor ground circuit. Now, power up the oscilloscope and select the appropriate voltage setting. With the engine running, observe the waveform pattern on the oscilloscope focusing on unexpected spikes or glitches.

If spikes or glitches are observed, carefully wiggle the wiring harness and connector for the CKP sensor in question to determine whether the problem is a loose connection or a defective sensor. If missing voltage blocks are noticed in the waveform pattern, suspect either a broken or worn reluctor ring or that the magnetic tip of the CKP sensor has excessive metallic debris. If no problems are found in the waveform pattern, proceed to the next step.

Step 5

Connect the test leads of the oscilloscope to CKP sensor signal input and ground circuits near the PCM connector and observe the waveform pattern. If the waveform pattern near the PCM connector is dissimilar to what was seen when the test leads were connected near the CKP sensor, suspect an open or shorted circuit between the CKP sensor connector and the PCM connector. If this is the case, disconnect all related controllers and begin testing individual circuits with the DVOM. Shorted or open circuits must be repaired or replaced. If the waveform pattern is identical

to what was seen when the test leads were connected near the CKP sensor, suspect a defective PCM or a PCM programming error.

Additional diagnostic notes:

- Some manufacturers recommend that CKP and CMP sensors are replaced as a set
- Use technical service bulletins to aid in the diagnostic process

Severity Description

When a P0337 is stored, the engine will not likely run and this code should be categorized as severe. Even if the engine will start and run, there is a high risk of a no start condition and there will be drivability repercussions.

Reference Sources

DIAGNOSTIC TROUBLE CODE DIAGNOSIS - page 1F-56.